Approved by the NextGen Advisory Committee October 2017

Joint Analysis Team: Performance Assessment of Boston/Gary Optimal Profile Descents and DataComm

Report of the NextGen Advisory Committee in Response to Tasking from the Federal Aviation Administration

October 2017

Joint Analysis Team: Performance Assessments of BOS/GYY OPDs & Datacomm

Contents

Introduction/Background

The NextGen Advisory Committee (NAC) has been instrumental in helping the Federal Aviation Administration (FAA) move forward with NextGen implementation. In 2014, the Committee approved a recommendation for a set of integrated plans on four focus areas of NextGen capabilities (DataComm, Multiple Runway Operations, PBN, and Surface).

These plans were developed by a joint FAA-Industry team, the NextGen Integration Working Group (NIWG), operating under the NAC. The goal of the NIWG is to identify implementation priorities that deliver measurable benefits by certain dates, and, thereby, increase the community's confidence in NextGen.

In June 2015, the NAC considered and approved six high level performance metrics intended to measure performance impacts attributable to the deployment of the four key NIWG capabilities outlined in the "NextGen Priorities Joint Implementation Plan" of October 2014. The set of metrics are intended for the FAA and industry to collaboratively monitor performance to understand the impact of implementations. The six metrics (detailed in Appendix B) are:

1. Actual Block Time 2. Actual Distance Flown 3. Estimated Fuel Burn	Measured by city pairs
4. Throughput – Facility Reported Capacity Rates 5. Taxi-Out Time 6. Gate Departure Delay	Measured at airports

Subsequently, the NAC formed the Joint Analysis Team (JAT) which includes operational and analytical experts from the FAA and industry. The JAT was formed to reach a common statement of fact regarding performance impacts and benefits that can be attributed to implementation of NextGen capabilities. To accomplish this goal, the JAT has analyzed data, metrics, methods and tools typically used by each of the parties in this type of assessment. This has included analyses of other measures deemed appropriate beyond the six metrics noted above.

The JAT has previously evaluated the following capabilities at the following locations:

- Wake ReCat Implementations at Charlotte Douglass International Airport (CLT), O'Hare International Airport (ORD), Chicago Midway International Airport (MDW), Indianapolis International Airport (IND) and Philadelphia International Airport (PHL)
- Performance Based Navigation (PBN) Metroplex Implementation in North Texas
- PBN Established on RNP (EoR) in Denver International Airport (DEN)

This report includes findings on Optimal Profile Descent (OPD) implementations in Boston Logan International Airport (BOS) and Gary/Chicago International Airport (GYY) as well as impacts of implementation of Data Communications.

Methodology

The JAT is comprised of data and analysis experts from the FAA as well as the aviation industry, and the team conducted a series of meetings to discuss and review ongoing analysis. For the OPD analyses, this team utilized a methodology previously agreed upon by the JAT to evaluate the change in time, distance and fuel in a terminal environment.

For the DataComm analysis, the JAT worked with the FAA's DataComm Program Office and their primary contractor, Harris Corporation, to develop the logic of an analysis methodology. The Harris Corporation was instrumental in providing operational data that the JAT processed and analyzed according to the agreed upon methodology.

The working dynamic between the FAA and industry team members remains a positive and professional one in which capable analysts from different perspectives challenged one another's perspectives. The final product of this body is the result of strong collaboration and sharing of data and ideas between the FAA and industry. The JAT continues to build trust and confidence amongst members throughout this process.

Summary of Findings

Boston OPDs

- For flights that reach cruise altitude outside 200 NM from Boston
  - Vertical profiles have improved through increased proportion of continuous descent operations, and shorter time and distance in level flight
  - Approximately 30 kg fuel savings per flight are attributable to OPDs
  - Observed minimal change in flight time, and between 0.2 and 0.6 nm increase in flight distance
- For flights that do reach cruise altitude inside 200 NM (includes flights from New York area to Boston)
  - Vertical profiles have improved through shorter time and distance in level flight
  - Approximately 20-25 kg fuel savings per flight are attributable to OPDs
  - Observed minimal change in flight time, and between 0.7 and 1.1 nm decrease in flight distance

Gary OPDs

- Safety benefits resulting from reduced interaction of high performance jets with VFR traffic, and from reduced interaction between Midway and Garry-Indiana traffic flows
- The JAT was unable to quantify benefits because of the small data sample; however, operator reported savings in fuel burn

DataComm

- Use of DataComm for delivering route revision clearances results in reduced workload for pilots and controllers
- Analysis demonstrates that flights using DataComm for route revision clearance exhibit shorter taxi-out times compared to those that use voice
  - Because of differences in demand profiles and airport geometry, feasibility of resequencing departures varies across airports, and causes variation in magnitude of benefit by airport
  - On average, taxi-out time savings are between 0.2 and 8.5 minutes for DataComm equipped aircraft with route revisions during May and June 2017 at BWI, EWR, DFW, MDW and PHX.
- Individual airlines prefer to evaluate DataComm benefits on a network (including all airports that provide DataComm service) or fleet level (i.e., narrow vs. wide body aircraft).
  - Network analysis by one large operator resulted in approximately 2.8 minutes of savings in average taxi out time for flights that used DataComm for route revision clearance compared to those that used voice.

Appendix A: Organizations Participating in the Joint Analysis Team

Airlines for America

Airports Council International (ACI North America)

American Airlines, Inc.

Cessna Aircraft Company

City of Houston, Texas

Dallas/Fort Worth International Airport

Delta Air Lines, Inc.

Federal Aviation Administration (FAA)

FedEx Express

Harris Corporation

ITI Aviation

JetBlue Airways

Jetcraft Avionics LLC

Landrum-Brown

National Air Traffic Controllers Association (NATCA)

PASSUR Aerospace

QED Consulting, LLC

RTCA, Inc.

Southwest Airlines

The MITRE Corporation

United Airlines, Inc.

United Parcel Service (UPS)

Appendix B: NAC Performance Metrics

	Metric	Reported Values	Comments
Measured on applicable existing *104* city-pairs:	1. Actual Block Time	Mean and std dev or 60% percentile	• Actual time from Gate-Out time to Gate-In time for a specified period of time by city pair • GA: IFR flight time from ramp taxi to ramp park
	2. Actual Distance flown	Mean and std dev or 60% percentile	• Actual track distance between key city pairs for a specified period of time • GA: IFR flight distance from take-off to TOC & from TOD to touch down
	3. Estimated Fuel burn	Mean and std dev	• Actual fuel burn for a specified period of time
Measured at applicable airports	4. Throughput – facility reported capacity rates*	Mean and peak capacity rates	• Facility Airport Arrival Rates (AAR) & Arrival Departure Rate (ADR) Airlines (recommend: http://www.fly.faa.gov/ois however, the working group is open to alternate measurements that meet the requirements) • GA: measured as access events – Radar vector and not SID as OUT event and Ground based nav and not GPS / WAAS-LPV as IN event
	5. Taxi-out Time*	Mean and std dev or 60% percentile	• Actual time from Gate-Out to Wheels-Off time by airport (minutes/flight) • GA: IFR flight taxi time from ramp taxi to take off
	6. Gate Departure Delay	Delays/100 act depts. And total delay minutes	• Difference in actual Gate-Out time and scheduled Gate-Out time, Not measured for GA

Appendix C: Further Detail on Methodology and Analysis